The DOE Webinar will begin shortly . . .

• Why is there no sound?
  – Once you logged into the webinar, you were provided two options to listen to this broadcast. The first option is through your computer speakers, the second option is via dialing the phone number provided to you upon login to the webinar. If you chose to listen through your computer speakers, you may need to turn your speaker volume on or up.

• Will DOE provide access to the recorded webinar after the meeting?
  – Yes, all those who registered will receive a link to the slides and to the recorded webinar soon after the meeting. It will also be available on the DOE SBIR/STTR web site.

• Where can I find the Topics being discussed today?
  – This link will take you to the Funding Opportunity Announcement (FOA) page that lists the FY 2019 Phase I Release 2 Topics: https://go.usa.gov/xUXpQ

• What if my question was not answered at today’s webinar?
  – Please contact the point of contact that follows each subtopic in the document listed above for further clarification.
  – If you have a question about the grant application process, please send us an email at: sbir-sttr@science.doe.gov or call us at (301) 903-5707.
DOE SBIR/STTR
Phase I Release 2 Topics Webinar

Topics associated with the
FY 2019 Phase I Release 2
Funding Opportunity Announcement

Topics 23-34

DOE SBIR/STTR Programs Office

November 7, 2018
TODAY’S AGENDA

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<tr>
<th>Topics Introduction</th>
<th>DOE SBIR/STTR Programs Office – Chris O’Gwin</th>
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<tr>
<td>Topics 23-25:</td>
<td>Office of Fusion Energy Sciences</td>
</tr>
<tr>
<td>Topics 26-32 :</td>
<td>Office of High Energy Physics</td>
</tr>
<tr>
<td>Topics 33-34 :</td>
<td>Office of Nuclear Energy</td>
</tr>
</tbody>
</table>
# FY 2019 Phase I Schedule

<table>
<thead>
<tr>
<th></th>
<th>Release 1</th>
<th>Release 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topics Issued</strong></td>
<td>Monday, July 16, 2018</td>
<td>Monday, October 29, 2018</td>
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<tr>
<td><strong>Webinar(s)</strong></td>
<td>Week of July 30, 2018</td>
<td>Week of November 5, 2018</td>
</tr>
<tr>
<td><strong>FOA Issued</strong></td>
<td>Monday, August 17, 2018</td>
<td>Monday, November 26, 2018</td>
</tr>
<tr>
<td><strong>Webinar(s)</strong></td>
<td>Friday, August 27, 2018</td>
<td>Friday, November 30, 2018</td>
</tr>
<tr>
<td><strong>Letters of Intent (LOI) Due</strong></td>
<td>Tuesday, September 4, 2018</td>
<td>Monday, December 17, 2018</td>
</tr>
<tr>
<td><strong>Non-responsive LOI Feedback Provided</strong></td>
<td>Tuesday, September 25, 2018</td>
<td>Monday, January 7, 2019</td>
</tr>
<tr>
<td><strong>Applications Due</strong></td>
<td>Monday, October 15, 2018</td>
<td>Monday, February 4, 2019</td>
</tr>
<tr>
<td><strong>Award Notification</strong></td>
<td>Monday, January 7, 2019</td>
<td>Monday, April 29, 2019</td>
</tr>
</tbody>
</table>
Phase I Funding Opportunity Announcements
Participating DOE Programs (FY 2019)

Phase I
- Office of Advanced Scientific Computing Research
- Office of Basic Energy Sciences
- Office of Biological and Environmental Research
- Office of Nuclear Physics
- Office of Science

Phase I Release 2
- Office of Cybersecurity, Energy Security, and Emergency Response
- Office of Defense Nuclear Nonproliferation
- Office of Electricity
- Office of Energy Efficiency and Renewable Energy
- Office of Environmental Management
- Office of Fossil Energy
- Office of Fusion Energy Sciences
- Office of High Energy Physics
- Office of Nuclear Energy
Funding Opportunity Announcement (FOA) Webinar

- FY19 Phase I Release 2 FOA will be issued on **November 26th**
- Join our Mailing List – this field is on every DOE SBIR/STTR web page
  - Following the issuance of the FOA, look for an email with a link to the FOA
- Webinar with Q&A for this FOA on **November 30th**
  - Overview of the FY 2019 DOE SBIR/STTR Programs
    - Following the issuance of the FOA, look for an email announcing this webinar
Topic Basics

- Topics are created by DOE program managers and define important technology breakthroughs needed in R&D areas that support the DOE mission.
- Topics are organized by DOE Program Office.
- DOE program managers are listed with each subtopic.
  - Questions to DOE program managers are limited to clarification of the topic and subtopic (including references).
  - Clarification is provided to help *you* determine whether your technology fits within the topic and subtopic.
  - You may communicate with these topic managers from the release of topics until the grant application due date.
  - The decision to apply is *yours*.
Example Topic

- **Topic & Subtopic**
  - You must specify the same topic and subtopic in your Letter of Intent and grant application

- **Topic Header**
  - Lists the maximum award amounts for Phase I & Phase II and the types of application accepted (SBIR and/or STTR)

- **Program Manager**
  - Each subtopic lists the responsible DOE program manager

- **“Other” Subtopic**

- **References**

<table>
<thead>
<tr>
<th>SBIR/STTR Program Office</th>
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### 12. INSTRUMENTATION FOR ADVANCED CHEMICAL IMAGING

<table>
<thead>
<tr>
<th>Maximum Phase I Award Amount</th>
<th>Maximum Phase II Award Amount</th>
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<tbody>
<tr>
<td>$200,000</td>
<td>$1,100,000</td>
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The Department of Energy seeks to advance chemical imaging technologies that facilitate fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels. The Department is particularly interested in forefront advances in imaging techniques that combine molecular-scale spatial resolution and ultrafast temporal resolution to explore energy flow, molecular dynamics, breakage, or formation of chemical bonds, or conformational changes in nanoscale systems.

Grant applications are sought in the following subtopics:

- **a. High Spatial Resolution Ultrafast Spectroscopy**
  - Chemical information associated with molecular-scale processes is often available from optical spectroscopies involving interactions with electromagnetic radiation ranging from the infrared spectrum to x-rays. Ultrafast laser technologies can provide temporally resolved chemical information via optical spectroscopy or laser-assisted mass sampling techniques. These approaches provide time resolution ranging from the breakage or formation of chemical bonds to conformational changes in nanoscale systems but generally lack the simultaneous spatial resolution required to analyze individual molecules. Grant applications are sought that make significant advancements in spatial resolution towards the molecular scale for ultrafast spectroscopic imaging instrumentation available to the research scientist. The nature of the advancement may span a range of approaches including sub-diffraction limit illumination or detection, selective sampling, and coherent or holographic signal analysis.

  Questions – Contact: James Rustad, James.Rustad@Science.doe.gov

- **b. Time Resolved Chemical Information from Hybrid Probe Microscopies**
  - Probe microscopy instruments (including AFM and STM) have been developed that offer spatial resolution of molecules and even chemical bonds. While probe-based measurements alone do not typically offer the desired chemical information on molecular timescales, methods that take advantage of electromagnetic interactions or sampling with probe tips have been demonstrated. Grant applications are sought that would make available to scientists new hybrid probe instrumentation with significant advancements in chemical and temporal resolution that are not required for molecular scale chemical interactions. The nature of the advancement may span a range of approaches and probe techniques, from tip-enhanced or plasmonic enhancement of electromagnetic spectroscopies to probe-induced sample interactions that localize spectroscopic methods to the molecular scale.

  Questions – Contact: James Rustad, James.Rustad@Science.doe.gov

- **c. Other**
  - In addition to the specific subtopics listed above, the Department invites grant applications in other areas that fall within the scope of the topic description above.

  Questions – Contact: James Rustad, James.Rustad@Science.doe.gov

**References**


Topic 23: ADVANCED TECHNOLOGIES AND MATERIALS FOR FUSION ENERGY SYSTEMS

<table>
<thead>
<tr>
<th>Maximum Phase I Award Amount: $200,000</th>
<th>Maximum Phase II Award Amount: $1,100,000</th>
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<tbody>
<tr>
<td>Accepting SBIR Phase I Applications: YES</td>
<td>Accepting STTR Phase I Applications: YES</td>
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</tbody>
</table>

a. Plasma Facing Components  
b. Blanket and Safety Technologies  
c. Superconducting Magnets and Materials  
d. Structural Materials and Coatings  
e. Other

Questions: Subtopics a, b, d & e – Daniel Clark, daniel.clark@science.doe.gov  
Questions: Subtopic c – Barry Sullivan, barry.sullivan@science.doe.gov
Topic 24: FUSION SCIENCE AND TECHNOLOGY

Maximum Phase I Award Amount: $200,000  Maximum Phase II Award Amount: $1,100,000
Accepting SBIR Phase I Applications: YES  Accepting STTR Phase I Applications: YES

a. Diagnostics
b. Components for Heating and Fueling of Fusion Plasmas
c. Simulation and Data Analysis Tools for Magnetically Confined Plasmas
d. Components and Modeling Support for Validation Platforms for Fusion Science
e. Other

Questions: Subtopic a – Matthew Lanctot, matthew.lanctot@science.doe.gov
Questions: Subtopic b & e – Barry Sullivan, barry.sullivan@science.doe.gov
Questions: Subtopic c – John Mandrekas, john.mandrekas@science.doe.gov
Questions: Subtopic d – Sam Barish, sam.barish@science.doe.gov
Topic 25: HIGH ENERGY DENSITY PLASMAS AND INERTIAL FUSION ENERGY

<table>
<thead>
<tr>
<th>Maximum Phase I Award Amount: $200,000</th>
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<td>Accepting SBIR Phase I Applications: YES</td>
<td>Accepting STTR Phase I Applications: YES</td>
</tr>
</tbody>
</table>

a. Driver Technologies
b. Ultrafast Diagnostics
c. High-intensity Short-pulse Laser Technologies
d. Other

Questions: Kramer Akli, Kramer.akli@science.doe.gov
**Topic 26:** ADVANCED CONCEPTS AND TECHNOLOGY FOR PARTICLE ACCELERATORS

<table>
<thead>
<tr>
<th>Maximum Phase I Award Amount: $200,000</th>
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<tr>
<td>Accepting SBIR Phase I Applications:</td>
<td>Accepting STTR Phase I Applications: YES</td>
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- a. Metal powder development for Additive Manufacture
- b. Improved Accelerator Modeling and Control System Software
- c. High Gradient Accelerator Research and Development
- d. High-Current Cathodes
- e. High-Emissivity Coating for Targets
- f. Non-Linear Magnets for High Dynamic Aperture Lattices
- g. Novel Beam Optics for High-Intensity Hadron Synchrotrons
- h. Other

Questions: John Boger, john.boger@science.doe.gov
Topic 27: RADIO FREQUENCY ACCELERATOR TECHNOLOGY

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<thead>
<tr>
<th>Maximum Phase I Award Amount: $200,000</th>
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<td>Accepting STTR Phase I Applications: YES</td>
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</table>

- a. Low Cost Radio Frequency Power Sources for Accelerator Application
- b. High Efficiency High Average Power RF Sources
- c. Other

Questions: Subtopic a & c – John Boger, john.boger@science.doe.gov
Questions: Subtopic b – Eric Colby, Eric.Colby@science.doe.gov
Topic 28: LASER TECHNOLOGY R&D FOR ACCELERATORS

| Cost Reduction of Ultrafast Fiber Laser Components | Maximum Phase I Award Amount: $200,000 |
| Novel, Scalable Techniques for Carrier-Envelope Phase Locking of Multiple Fiber Lasers | Maximum Phase II Award Amount: $1,100,000 |
| Ceramic-Based Optical Materials | Accepting SBIR Phase I Applications: YES |
| Aperture-Scalable High Performance Diffraction Gratings | Accepting STTR Phase I Applications: YES |
| Computer Modeling Based Development of High Power Coatings for Ultrafast Optics | |
| High Efficiency Spatial Mode Shaping and Control for High Power Ultrafast Lasers | |
| Other | |

Questions: Eric Colby, eric.colby@science.doe.gov
Topic 29: SUPERCONDUCTOR TECHNOLOGIES FOR PARTICLE ACCELERATORS

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<th>Maximum Phase I Award Amount: $200,000</th>
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<tr>
<td>Accepting SBIR Phase I Applications: YES</td>
<td>Accepting STTR Phase I Applications: YES</td>
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a. High-Field Superconducting Wire and Cable Technologies for Magnets
b. Superconducting Magnet Technology
c. Superconducting RF Cavities
d. Cryogenic and Refrigeration Technology Systems
e. Other

Questions: Ken Marken, ken.marken@science.doe.gov
Topic 30: HIGH-SPEED ELECTRONIC INSTRUMENTATION FOR DATA ACQUISITION AND PROCESSING

<table>
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<tr>
<th>Maximum Phase I Award Amount: $200,000</th>
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<tr>
<td>Accepting SBIR Phase I Applications: YES</td>
<td>Accepting STTR Phase I Applications: YES</td>
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a. Radiation Hard CMOS Sensors for Detectors at High Energy Colliders
b. Engineered Substrates for Particle Detectors at High Energy Colliders
c. Technology for Post-Processing of Junctions for CMOS and CCD Sensors
d. Specialty Wafers and Thick Sensors for HEP Dark Matter Detectors
e. High Density Chip Interconnect Technology

Questions: Helmut Marsiske, helmut.marsiske@science.doe.gov
f. Radiation-Hard High-Bandwidth Data Transmission for Detectors at High Energy Colliders

g. Custom Real Time Massively Parallel Trigger Processors for Detectors at High Energy Colliders

h. Frequency Multiplexed DAQ Systems Motivated by Cosmic Microwave Background Detectors

i. Electronic Tools for Picosecond (ps) Timing

j. Other

Questions: Helmut Marsiske, helmut.marsiske@science.doe.gov
Topic 31: HIGH ENERGY PHYSICS DETECTORS AND INSTRUMENTATION

<table>
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<tr>
<th>Maximum Phase I Award Amount: $200,000</th>
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<td>Accepting SBIR Phase I Applications: YES</td>
<td>Accepting STTR Phase I Applications: YES</td>
</tr>
</tbody>
</table>

a. Lower Cost, Higher Performance Visible/(V)UV Photon Detection  
b. Technology for Large Cryogenic Detectors  
c. Cryogenic Bolometer Array Technologies  
d. Ultra-Low Mass, High-Rate Charged Particle Tracking  
e. Scintillating Detector Materials and Wavelength Shifters  
f. Ultra-Low Background Detectors and Materials  
g. Advanced Composite Materials  
h. Additive Manufacturing  
i. Other  

Questions: Helmut Marsiske, helmut.marsiske@science.doe.gov
Topic 32: QUANTUM INFORMATION SCIENCE (QIS) SUPPORTING TECHNOLOGIES

Maximum Phase I Award Amount: $200,000  Maximum Phase II Award Amount: $1,100,000
Accepting SBIR Phase I Applications: YES  Accepting STTR Phase I Applications: YES

a. Development of Optimal SRF Cavity Geometries for Quantum Information Systems
b. Optimization of Fabrication Techniques for Scalable 3D SRF Structures for Quantum Information Systems
c. Development of Low-Temperature Technologies for QIS Systems
d. Photodetectors for Optical to Microwave Transduction of Quantum Information
e. Other

Questions: Altaf Carim, altaf.carim@science.doe.gov
a. Advanced Sensors and Instrumentation (Crosscutting Research)
b. Advanced Technologies for the Fabrication, Characterization of Nuclear Reactor Materials
   Protection Accounting and Control for Domestic Fuel Cycles
d. Advanced Modeling and Simulation
e. Plant Modernization
f. Materials R&D

Questions: Subtopic a – Suibel Schuppner, Suibel.Schuppner@nuclear.energy.gov
Questions: Subtopic b – Frank Goldner, Frank.Goldner@nuclear.energy.gov
Questions: Subtopic c – Michael Reim, michael.reim@nuclear.energy.gov
Questions: Subtopic d – David Henderson, David.Henderson@nuclear.energy.gov
Questions: Subtopic e & f – Alison Hahn, Alison.Hahn@nuclear.energy.gov
g. Component Development for Energy Conversion Systems to Support Nuclear Power Systems

h. Advanced Methods for Manufacturing

i. Cybersecurity Technologies for Protection of Nuclear Safety, Security, or Emergency

j. Other

Questions: Subtopic g – Brian K. Robinson, Brian.Robinson@nuclear.energy.gov
Questions: Subtopic h – Tansel Selekler, Tansel.Selekler@nuclear.energy.gov
Questions: Subtopic i – Trevor Cook, Trevor.Cook@nuclear.energy.gov
Questions: Subtopic j – Won Yoon, Won.Yoon@nuclear.energy.gov

Maximum Phase I Award Amount: $200,000
Maximum Phase II Award Amount: $1,100,000
Accepting SBIR Phase I Applications: YES
Accepting STTR Phase I Applications: YES
Advanced Technologies for the Fabrication and Characterization of Nuclear Reactor Fuel

Frank Goldner
Program Manager, Accident Tolerant Fuels

Janelle Eddins
Program Manager, Advanced Reactor Fuels

Madeline Feltus
Program Manager, High Temperature Gas Reactor Fuels

FY19 Phase I Release 2 Topics Webinar
November 7, 2018
Mission:

1) Support development of near-term Accident Tolerant Fuel (LWR) technologies
2) Perform research and development on longer-term Advanced Reactor Fuel technologies

Accident Tolerant Fuels
LWR fuels with improved performance and enhanced accident tolerance

Advanced Reactor Fuels
Advanced reactor fuels for enhanced resource utilization

Capacity Development to Support Fuel Development and Qualification
Advanced characterization and PIE techniques
Advanced in-pile instrumentation
Separate effects testing for model development/validation
Transient testing infrastructure

Fuels Product Line
Multi-scale, multi-physics, fuel performance modeling and simulation
Following the accident at Fukushima, Congress directed the Department of Energy to begin developing fuels with enhanced accident tolerance that can be used in existing light water reactors.

The Development Plan:
- Defines the general attributes of accident tolerant fuel
- Lays out an aggressive 10-year schedule starting in 2012
- Establishes the goal of inserting lead fuel rods/assemblies in an operating commercial light water reactor by 2022
Industry-led Development of ATF Concepts

**Framatome**
- Cr-coated M5 cladding
- Doped UO₂ for improved thermal conductivity and performance
- SiC cladding

**General Electric**
- Coated Zr cladding
- Iron-based cladding (FeCrAl)
- ODS variants for improved strength

**Westinghouse**
- Cr-coated Zirlo cladding
- SiC cladding
- Alternative fuels with improved thermal conductivity and high density
Advanced Reactor Fuel Development

- Metallic Fuels for Closed Fuel Cycles and Actinide Transmutation

- Fuels for Once-through Fast Spectrum Reactors
  - Na-free, annular metallic fuel concepts
  - Ultra-high burnup for enhanced resource utilization
  - Non-traditional applications such as microreactors

- Fuels for High Temperature, Fast Spectrum Reactors
  - Higher cladding temperature/performance (ODS alloys)
  - Metallic fuels with additives and/or cladding coatings/liners
  - UN, UO₂ for LFR UC for GFR
AFC Priorities: FY19 Forward

1) Support the industry-led development of Accident Tolerant Fuel (ATF) technologies with improved reliability and performance under normal operations and enhanced tolerance during hypothetical accident scenarios, with implementation of lead test rods/assemblies of one or more ATF concepts in commercial reactor(s) by 2022.

2) Lead research and development on innovative fuel and cladding technologies for applications to future advanced reactors, especially fast-spectrum reactors, including reactors that utilize both once-through and recycle scenarios.

3) Continue the development and demonstration of the science-based approach applied to fuel development, contributing to the establishment of state-of-the-art R&D infrastructure necessary to accelerate the development of advanced fuel concepts.

4) Collaborate with NEAMS on the development and validation of multi-scale, multi-physics, and increasingly predictive fuel performance models and codes.
AGR TRISO Program Goals:

- Re-establish U.S. TRISO fuel production capability
- Demonstrate TRISO irradiation performance (good fission product retention) during normal operations and accident conditions (1600°C).
- Submit TRISO program test results in licensing topical reports to NRC that demonstrate UCO TRISO fuel is qualified for generic High Temperature Gas Reactor designs (2026)
AGR TRISO Priorities: FY19 Forward

Nuclear Energy

- Continue AGR-5/6/7 irradiation test of vendor-fabricated prototypic-scale TRISO compacts (2019-2022)
- Complete PIE and final report of AGR-2 tests of testing TRISO particles made at prototypic production scale (2020)
- Complete PIE and final report of AGR-3/4 experiments containing designed-to-fail TRISO particles expected to fail during irradiation that provide fission product transport data (2021)
- Complete irradiation of final AGR experiment (AGR-5/6/7) which serves as a TRISO fuel margin and qualification test based on selected fuel specifications (2022)
- Commence PIE, heat up experiments, and air/moisture ingress safety tests of the final AGR experiment (AGR-5/6/7) compacts (2023)
- Submit TRISO fuel performance, PIE and safety test results in licensing topical reports to NRC to demonstrate TRISO fuel is qualified for generic High Temperature Gas Reactor designs (2026)

HOWEVER some TRISO-fueled reactor designs use PEBBLES, not compacts.

This SBIR/STTR call seeks automated PEBBLE TRISO fuel fabrication and new NDE methods.
Contact Information

AFC National Technical Director:
- Steve Hayes (INL), steven.hayes@inl.gov

AGR TRISO Technical Director:
- Paul Demkowicz (INL), paul.demkowicz@inl.gov

Federal Program Managers:
- Frank Goldner, frank.goldner@nuclear.energy.gov
- Janelle Eddins, janelle.eddins@nuclear.energy.gov
- Madeline Feltus, madeline.feltus@nuclear.energy.gov
Advanced Fuels Website
https://nuclearfuel.inl.gov

Accident Tolerant LWR Fuel Information Sheet
OSTI Document Links of Interest:

Overview of Accident Tolerant Fuel Program
http://www.osti.gov/scitech/servlets/purl/1130553

Accident Tolerant Fuel Performance Metrics
http://www.osti.gov/scitech/servlets/purl/1129113

INL Document Links of Interest:

Advanced Fuel Cycle Web Site:
https://nuclearfuel.inl.gov/afp/SitePages/Home.aspx

2017 Accomplishments Report
https://nuclearfuel.inl.gov/afp/AFC%20Accomplishments%202017/index.aspx?page=1

AGR TRISO 2018 Technical Plan Document:

AGR TRISO ART Program Web Site: https://art.inl.gov/SitePages/ART%20Program.aspx#4
Topic 34: ADVANCED TECHNOLOGIES FOR NUCLEAR WASTE

<table>
<thead>
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</table>

a. Spent Fuel and Waste Science and Technology, Disposal R&D
b. Spent Fuel and Waste Science and Technology, Storage & Transportation R&D
c. Spent Fuel and Waste Science and Technology, Other R&D

Questions: Subtopic a – Mark Tynan, Mark.Tynan@doe.gov
Questions: Subtopic b – John Orchard, John.Orchard@doe.gov
Questions: Subtopic c – Prasad Nair, Prasad.Nair@doe.gov
DOE SBIR/STTR Programs Office
Contact Information

- SBIR/STTR Web:  [www.science.energy.gov/sbir](http://www.science.energy.gov/sbir)
- Email:  [sbir-sttr@science.doe.gov](mailto:sbir-sttr@science.doe.gov)
- Phone Assistance Hotline:  301-903-5707
- DOE Phase 0 Assistance Program:  [http://www.dawnbreaker.com/doephase0/](http://www.dawnbreaker.com/doephase0/)
- DOE Application Assistance:  [www.doesbirlearning.com](http://www.doesbirlearning.com)